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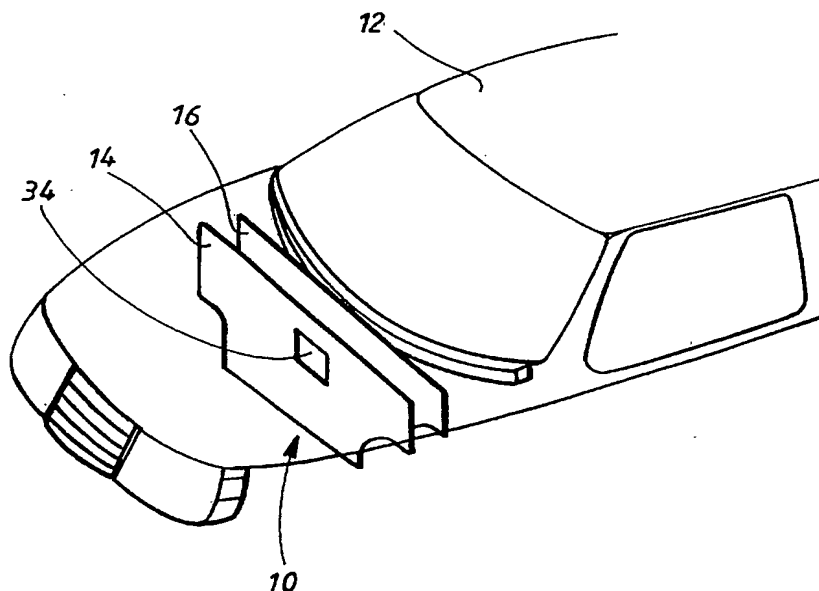
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(71) Applicant (for all designated States except US): AB VOLVO [SE/SE]; S-405 08 Göteborg (SE).			
(72) Inventors; and (75) Inventors/Applicants (for US only): NAERT, Michel [SE/SE]; Gråskärsgatan 24, S-421 59 Västra Frölunda (SE). ALMEFELT, Lars [SE/SE]; Carl Grimbergsgatan 44, S-413 13 Göteborg (SE).			
(74) Agents: GRAUDUMS, Valdis et al.; Albihns Patentbyrå Göteborg AB, P.O. Box 142, S-410 22 Göteborg (SE).			

Published

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(54) Title: VEHICLE FIREWALL



(57) Abstract

A vehicle firewall (10) has a first wall (14) which is arranged to extend transversely across a vehicle (12). The firewall further includes a second wall (16) extending substantially parallel to the first wall (14), with one of either the first or second wall extending over at least 60 % of the surface area of the other wall.

TITLE: Vehicle firewall

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TECHNICAL FIELD:

The present invention relates to a vehicle firewall according to the preamble of claim 1.

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BACKGROUND OF THE INVENTION:

A typical motor vehicle, for example a passenger car, comprises a chassis of unitary construction. In other words, a large number of individual panels are joined together to form a stress-bearing structure to which i.a. suspension, transmission and drive components can be affixed. An integral part of the chassis is the firewall which typically separates a passenger compartment from an engine compartment. Thus, in a front-engined vehicle, the firewall extends transversely across the vehicle ahead of and below the windscreen.

A firewall serves many purposes. For example, not only does the firewall contribute to the torsional stiffness of the vehicle chassis, it must also protect occupants of the vehicle from intrusion of the engine into the passenger compartment in the event of a collision and resist possible fire-breakthrough. Furthermore, the firewall serves to support various items of ancillary equipment, such as a dashboard, a steering column, a heater unit, a pedal box, a brake servo, etc.

The firewall of a typical vehicle is made from a sheet of pressed steel and is welded to adjacent panels making up the vehicle chassis. Since, in a front-engined vehicle, the firewall separates the engine from the passenger compartment, the steel firewall is normally clad with a layer of sound-insulating material. Since the firewall must be provided with a number of openings to allow components such as a steering column, throttle cable, brake control means and electrical cables, to pass therethrough, the

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layer of sound-insulating material must be carefully positioned on the firewall so that it does not affect the operation of these components.

5 It is a general goal within the automotive industry to reduce the weight of vehicles and to simplify production techniques, whilst still maintaining accepted levels of comfort and refinement.

10 SUMMARY OF THE INVENTION:

It is therefore an object of the present invention to provide a vehicle firewall which, when compared to present day constructions, lends itself to simplified manufacture whilst offering the possibility of reduced weight and fewer  
15 number of components.

This object is achieved by the vehicle firewall as claimed in claim 1.

20 Thanks to the provision of a double-walled firewall, a cavity between the firewalls is defined. This cavity contributes to sound insulation as well as providing a space within which various ancillary components of the vehicle can be housed. In this manner, an integrated  
25 assembly can be formed before the firewall is affixed to the remainder of the vehicle chassis. Furthermore, the double-walled structure provides increased protection against engine intrusion into the passenger compartment in the event of a frontal collision.

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Preferred embodiments of the firewall according to the present invention are defined in the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS:

The invention will be described in the following in greater detail by way of example only, and with reference to the attached drawings, in which

- 5      Fig. 1                      is a simplified schematic perspective view of a vehicle equipped with a vehicle firewall according to the present invention;
- 10     Fig. 2                      is a schematic perspective view of a firewall according to the present invention functionally integrated with a vehicle dashboard construction;
- 15     Fig. 3                      is a schematic sectional view along line III-III of Fig. 2;
- Fig. 4                      is a schematic perspective view of a second embodiment of a firewall according to the present invention functionally integrated with a vehicle dashboard construction, and
- 20     Fig. 5                      is a schematic sectional view along line V-V of Fig. 4.
- 25

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS:

In the drawings, reference numeral 10 generally denotes a firewall according to the present invention. With particular reference to Fig. 1, the firewall 10 is intended to be arranged transversely in a vehicle 12. The firewall comprises a first wall 14 and a second wall 16, with the walls being substantially mutually parallel. Although in the drawings the first and second walls are shown as being substantially coextensive, this is only a preferred embodiment and the invention may be realised with a

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firewall having one wall which extends at least 60%, preferably at least 80%, over the surface area of the other wall.

5 As is apparent from Figs. 1, 3 and 5, the first wall 14 and said second wall 16 are spaced by a distance of between 1 cm and 40 cm, preferably between 5 cm and 30 cm, most preferably about 20 cm, to thereby define a cavity 18. In  
10 a manner which will be explained later, the provision of a cavity 18 contributes to sound absorption as well as providing a space for housing items of ancillary equipment.

In terms of choice of material for the firewall, it is to be appreciated that, dependent on i.a. weight constraints  
15 and manufacturing techniques, any material which offers the required properties as regards strength and fire-resistance may be used. Due to the provision of a double-walled firewall, it is sufficient if only one of the two walls is made of a material which fulfils the above-mentioned  
20 requirements. Possible materials may thus be selected from the group consisting of steel, aluminium, magnesium, glass-fibre reinforced polypropylene, ABS, glass-fibre reinforced polyester and talcum-filled polypropylene, or a laminate thereof.

25 In terms of weight-saving, it is advantageous to produce the firewall from a plastic material. A suitable material is hot-pressed glass-fibre reinforced polypropylene having a 40% glass fibre content. An advantage with this method of  
30 production is that relatively intricate shapes can be attained without the need for subsequent finishing steps.

In a further embodiment, one or both of the walls of the firewall may be made from a laminate of sheet metal and  
35 plastic, preferably joined together by a polymer foam. Such a laminate provides excellent sound-insulation properties

whilst the metal plate ensures high resistance to fire breakthrough.

Irrespective of the choice of material or materials for the firewall, it is to be understood that the thickness of the first wall and the second wall need not be identical. Indeed, the thickness of each wall may be varied at different locations on the respective wall to thereby provide regions of increased stiffness, for example at mounting points for ancillary equipment.

In an alternative preferred embodiment, one wall of the firewall may be made from a fire-resistant polymer and the other in a sheet material to which plastic components may be affixed.

Due i.a. to the production techniques which may be employed to manufacture the firewall of the present invention, the firewall may be functionally integrated with other components of the vehicle. By the expression "functionally integrated", it is meant that the firewall of the vehicle is arranged so that it serves at least two distinct functions. Thus, and with particular reference to Figs. 2 and 3, the firewall 10 according to the present invention may also serve as a support for various driving units, this task previously being performed by a separate support member extending between the A-posts of the vehicle. The expression "driving units" hereby denotes any vehicle system or component which is located between the A-pillars of a vehicle. Accordingly, the firewall of the present invention may be adapted to support driving units such as a steering column 20, a passenger airbag 22, an instrument housing 24 and a dashboard panel (not shown).

As is apparent from Fig. 3, the firewall 10 may also be functionally integrated with a vehicle dashboard structure,

generally denoted by reference numeral 26. The expression "vehicle dashboard structure" hereby denotes a generally transversely extending structure which is adapted to support instruments, switches, heater controls, ventilation channels, etc. Thus, in one embodiment of the invention, the second wall 16 of the firewall 10 extends beyond the upper edge of the first wall 14 and constitutes a lower surface of the dashboard structure. The second wall and the dashboard structure may cooperate in such a manner that the second wall 16 partially delimits an air ventilation or heating channel 28 in the dashboard 26 structure.

In a further embodiment of the invention, and as shown in Fig. 3, the firewall 10 may be functionally integrated with a floor section 30 in the vehicle. Thus, the first wall 14 extends beyond the lower extreme of the second wall 16 to constitute a section of the floor 30.

Since the firewall of the present invention may be functionally integrated with e.g. the dashboard structure or floor, fewer components are required and assembly of the vehicle is facilitated.

As previously mentioned, the cavity 18 which is created between the first wall 14 and the second wall 16 of the firewall may be utilized to house items of ancillary equipment. Thus, and as illustrated in Figs. 4 and 5, a vehicle climate unit 32 may be adapted to fit within the cavity. Advantageously, the first and second walls of the firewall may be formed so as to serve as air passageways for the transportation of air to and from the climate unit 32.

In the event that the cavity 18 in the firewall is used to house items of ancillary equipment, then it is advantageous to provide at least one opening in either the first wall 14

or the second wall 16 to allow access to the items. Thus,  
and as shown in Figs. 1 and 4, one or more openings 34 may  
be provided in the firewall 10. In order to retain fire and  
sound insulation properties, the openings are preferably  
5 covered by a removable panel.

Before the firewall 10 is installed in the vehicle 12, any  
items of ancillary equipment may be secured in the cavity  
18 between the two walls 14, 16. The firewall 10 can then  
10 be mounted in the vehicle as a single complete unit.  
Naturally, should the firewall be functionally integrated  
with e.g. the dashboard structure of the vehicle, then the  
dashboard structure will also be included in the single  
complete unit for mounting in the vehicle.

15 The invention is not restricted to the embodiments  
described above and shown in the drawings, but may be  
varied within the scope of the appended claims.

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## CLAIMS:

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1. A vehicle firewall (10) comprising a first wall (14) arranged to extend transversely across a vehicle, characterized in that said firewall further comprises a second wall (16) extending substantially parallel to said first wall (14), one of said first and second walls extending over at least 60%, preferably at least 80%, of the surface area of the other of said walls.

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2. The vehicle firewall (10) as claimed in claim 1, characterized in that said first wall (14) and said second wall (16) are spaced by a distance of between 1 cm and 40 cm, preferably between 5 cm and 30 cm, most preferably about 20 cm, to thereby define a cavity (18).

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3. The vehicle firewall (10) as claimed in claim 1 or claim 2, characterized in that said first and second walls are made from material selected from the group consisting of steel, aluminium, magnesium, glass-fibre reinforced polypropylene, ABS, glass -fibre reinforced polyester and talcum-filled polypropylene, or a laminate thereof.

25

4. The vehicle firewall (10) as claimed in claim 2 or claim 3, characterized in that said cavity (18) is adapted to house a vehicle climate unit (32).

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5. The vehicle firewall (10) as claimed in any one of claims 1 to 4, characterized in that said firewall is adapted to support a driving unit such as a steering column (20), a passenger airbag (22), an instrument housing (24) and a dashboard panel.

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6. The vehicle firewall (10) as claimed in any one of claims 1 to 5, characterized in that said firewall is functionally integrated with a vehicle dashboard structure (26).

5

7. The vehicle firewall (10) as claimed in claim 6, characterized in that one of said walls of said firewall at least partially delimits a heating or ventilation channel (28) in said vehicle dashboard (26).

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8. The vehicle firewall (10) as claimed in any one of the preceding claims, characterized in that said firewall is functionally integrated with a floor section (30) in said vehicle.

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9. The vehicle firewall (10) as claimed in any one of the preceding claims, characterized in that at least one of said first and second walls is provided with an opening (34) to allow access to said cavity (18).

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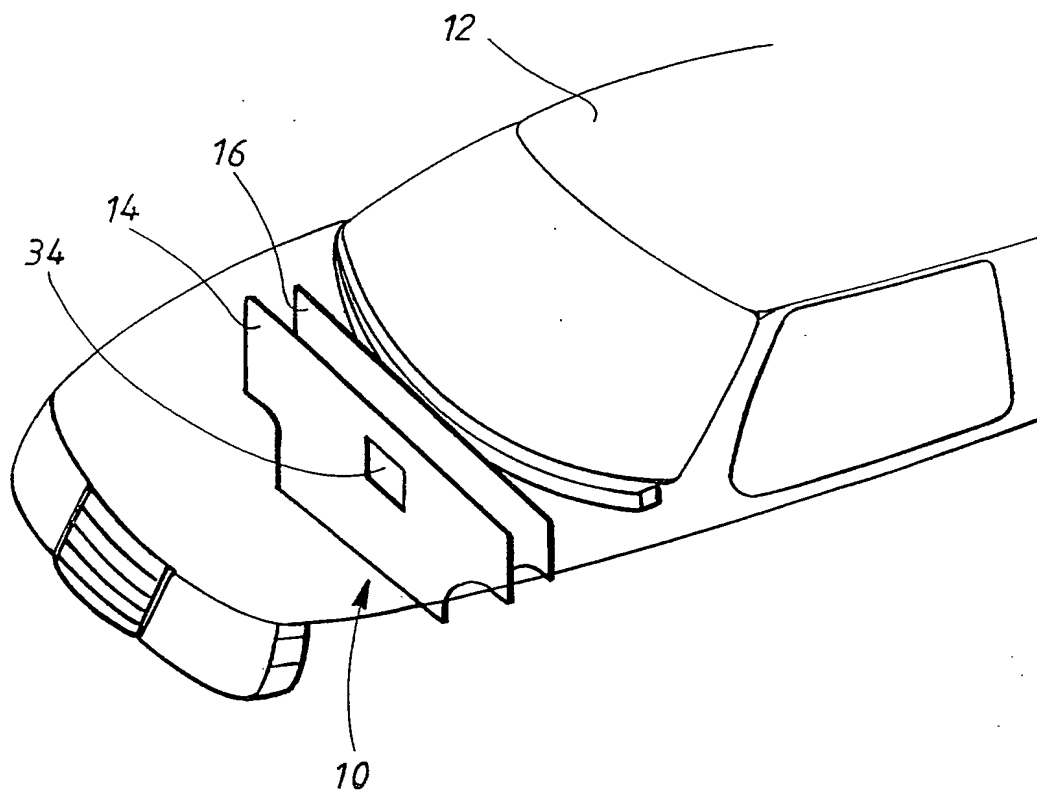
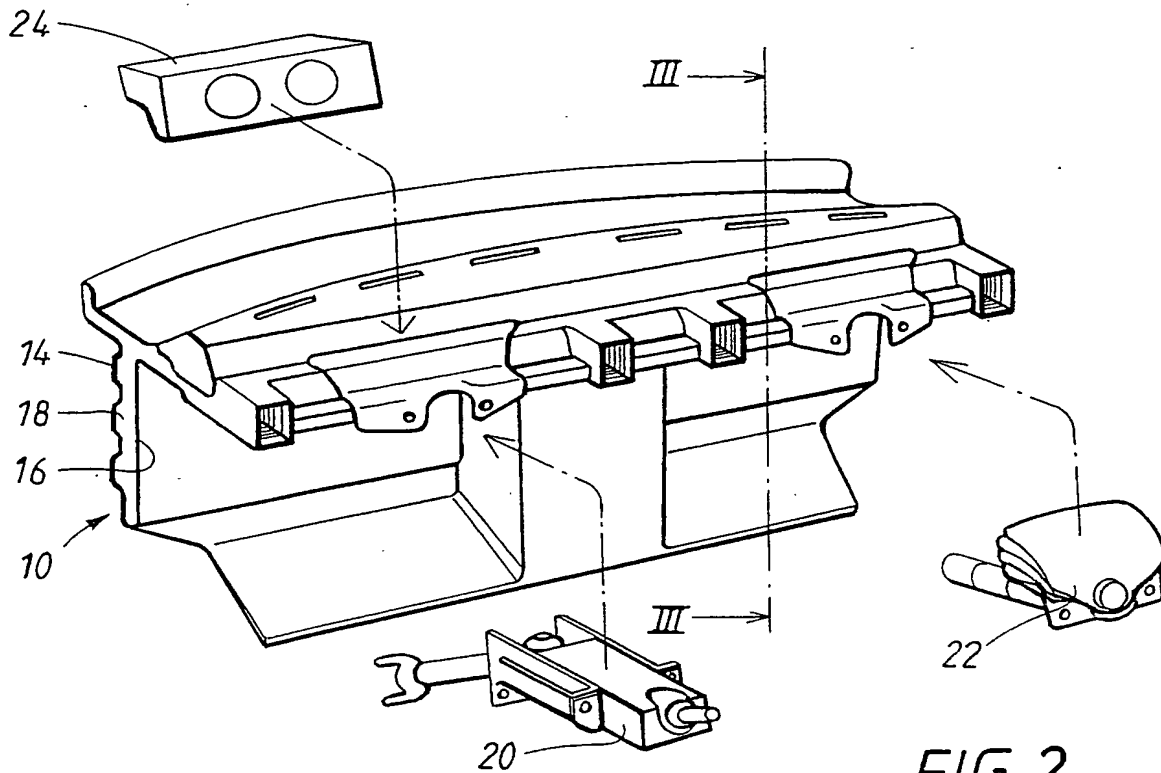
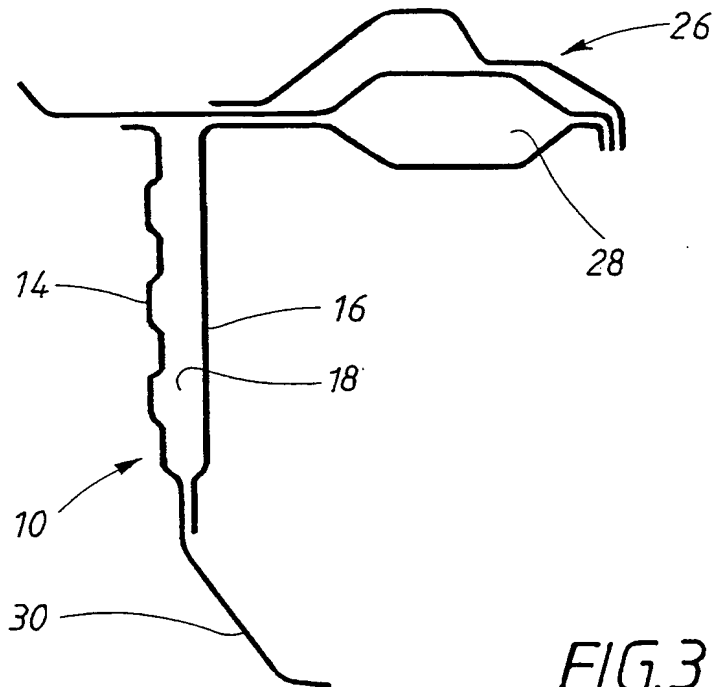


FIG. 1

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FIG. 2FIG. 3

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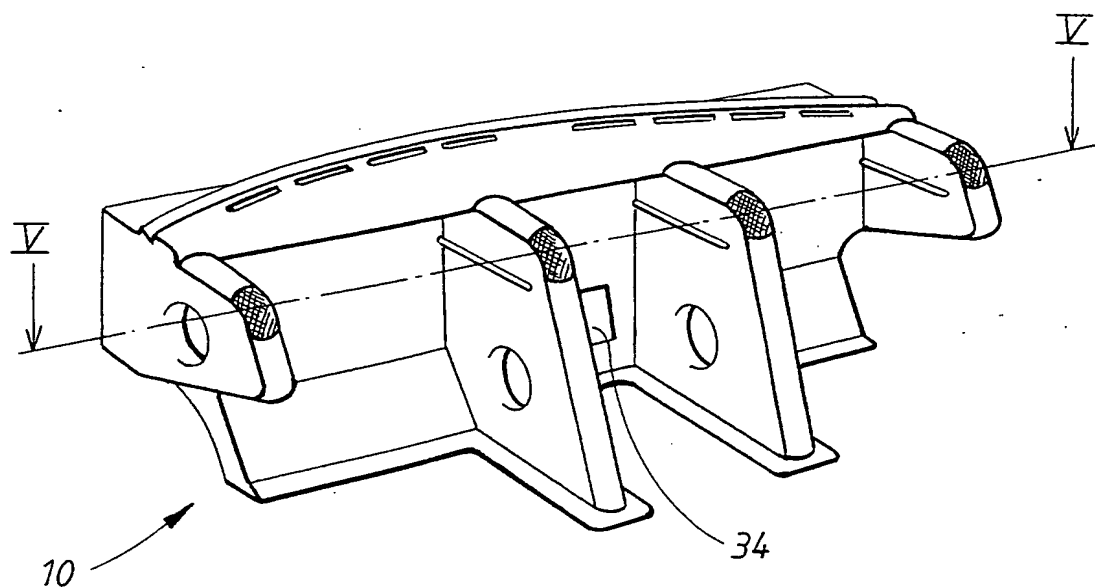


FIG. 4

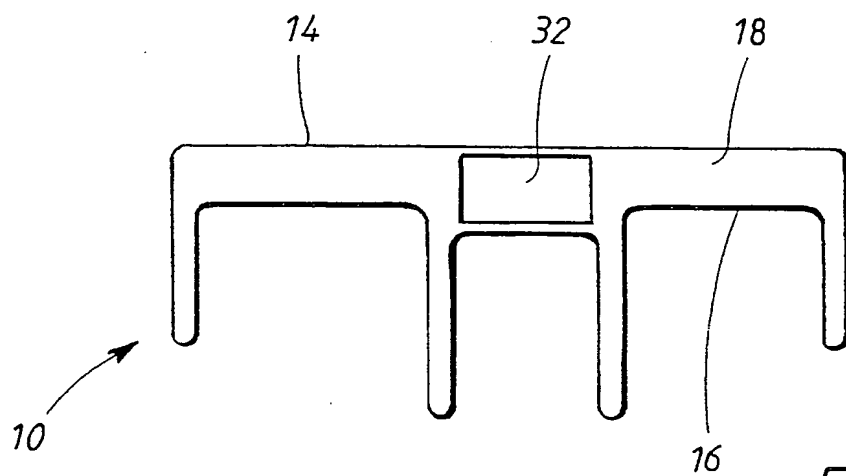


FIG. 5

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/SE 98/01664

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A62C 3/07, B62D 25/08, B60R 13/08

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A62C, B62D, B60R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 3800740 A1 (DAIMLER-BENZ AKTIENGESELLSCHAFT), 3 August 1989 (03.08.89), column 1, line 54 - line 65  --	1-9
A	DE 4231219 A1 (MERCEDES-BENZ AKTIENGESELLSCHAFT), 24 March 1994 (24.03.94)  -- -----	1-9

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

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Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer

Leif Törn  
Telephone No. +46 8 782 25 00

# INTERNATIONAL SEARCH REPORT

Information on patent family members

01/12/98

International application No.

PCT/SE 98/01664

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3800740 A1	03/08/89	NONE	
DE 4231219 A1	24/03/94	NONE	